AMENDMENTS TO THE CLAIMS

1 (Currently amended). A method of optimizing production in a well, comprising:

operating an artificial lift system in a wellbore;

monitoring a plurality of production parameters at the surface;

monitoring a plurality of downhole parameters in the wellbore;

evaluating measured data derived from the plurality of production parameters and the plurality of downhole parameters according to an optimization model that optimizes at least one function of the measured data; and

adjusting operation of the artificial lift mechanism based on the ~~automatic~~ evaluation.

2 (Currently amended). The method as recited in claim 1, wherein operating an artificial lift system comprises operating an electric submersible pumping system.

3 (Original). The method as recited in claim 1, wherein monitoring the plurality of production parameters comprises measuring a tubing pressure and a tubing temperature.

4 (Original). The method recited in claim 1, wherein monitoring the plurality of production parameters comprises measuring a casing pressure.

5 (Original). The method as recited in claim 1, wherein monitoring the plurality of production parameters comprises measuring multiphase flow data.

6 (Original). The method as recited in claim 1, wherein monitoring the plurality of production parameters comprises measuring a tubing pressure, a tubing temperature, a casing pressure, and multiphase flow data.

7 (Original). The method as recited in claim 1, wherein monitoring the plurality of downhole parameters comprises measuring a pump intake pressure.

8 (Original). The method as recited in claim 1, wherein monitoring the plurality of downhole parameters comprises measuring a pump discharge pressure.

9 (Original). The method as recited in claim 1, wherein monitoring the plurality of downhole parameters comprises measuring an intake temperature.

10 (Original). The method as recited in claim 1, wherein monitoring the plurality of downhole parameters comprises measuring a pump intake pressure, a pump discharge pressure and an intake temperature.

11 (Original). The method as recited in claim 1, wherein monitoring the plurality of downhole parameters comprises measuring distributed temperature.

12 (Original). The method as recited in claim 1, wherein monitoring the plurality of downhole parameters comprises measuring a fluid viscosity.

13 (Original). The method as recited in claim 1, wherein monitoring the plurality of downhole parameters comprises measuring a fluid density.

14 (Original). The method as recited in claim 1, wherein monitoring the plurality of downhole parameters comprises measuring a bubble point.

15 (Original). The method as recited in claim 1, wherein at least one of monitoring a plurality of production parameters and monitoring a plurality of downhole parameters comprises using a multiphase flowmeter.

16 (Currently amended). The method as recited in claim 1, wherein the step of evaluating measured data comprises processing the data on a computer.

17 (Currently amended). The method as recited in claim 1, wherein the step of adjusting operation of the artificial lift mechanism comprises changing a frequency output of a variable speed drive.

18 (Currently amended). The method as recited in claim 1, wherein the step of adjusting operation of the artificial lift mechanism comprises adjusting a choke to change flow rate.

19 (Currently amended). The method as recited in claim 1, wherein the step of adjusting operation of the artificial lift mechanism comprises removing a blockage.

20 (Currently amended). The method as recited in claim 1, wherein the step of adjusting operation of the artificial lift mechanism comprises repairing a leak.

21 (Currently amended). A system for optimizing production in a well, comprising:

an electric submersible pumping system positioned in a well;

a sensor system having sensors positioned in the well and/or at the surface to sense a plurality of production related parameters; and

a well modeling module operatively connected to the sensors ~~able~~ to receive input from the sensors, wherein the well modeling module is able to contrast model values with measured data based on input from the sensors in a manner indicative of specific problem areas detrimental to optimizing production from the well.

22 (Original). The system as recited in claim 21, wherein the production related parameters are sensed in real time.

23 (Currently amended). The system as recited in claim 21, further comprising a validation module operatively connected to the well modeling module for validating data used in modeling the well.

24 (Original). The system has recited in claim 21, wherein the sensor system comprises sensors positioned to take both downhole measurements and surface measurements.

25 (Original). The system as recited in claim 23, wherein the validation module is able to validate pressure, volume, and temperature data.

26 (Original). The system as recited in claim 23, wherein the validation module is able to validate an above the pump fluid gradient.

27 (Original). The system as recited in claim 23, wherein the validation module is able to validate a differential pressure across the pump.

28 (Original). The system as recited in claim 23, wherein the validation module is able to validate an outflow versus an inflow of fluid to the pump.

29 (Canceled).

30 (Currently amended). The system as recited in claim 21 ~~29~~, wherein the system ~~correcting a specific problem area~~ comprises ~~changing a frequency output of~~ a variable speed drive, the frequency output of which is adjustable in response to a specific problem area indicated by the well modeling module.

31 (Currently amended). The system as recited in claim 21 ~~29~~, wherein the system ~~correcting a specific problem area~~ comprises ~~adjusting a~~ an adjustable choke to change flow rate.

32-34 (Canceled).

35 (Currently amended). A method of diagnosing the operation of an electric submersible pumping system, the system having a pump powered by a submersible motor, sensors for measuring production related data, and a processing system for calculating values of production related data and comparing calculated production related data and measured data, the method comprising:

~~gathering~~ measuring production related data with the sensors;

comparing calculated pressure, volume, and temperature values with ~~against~~ measured pressure, volume, and temperature data;

calculating above the pump gradient values;

~~checking~~ comparing calculated above the pump gradient values with ~~against~~ measured data;

calculating across the pump values;

~~matching~~ comparing calculated across the pump values with measured data; and

~~determining~~ identifying any ~~unwanted~~ discrepancies between calculated values and measured data.

36 (Currently amended). The method as recited in claim 35, wherein comparing calculated across the pump values with measured data ~~matching~~ comprises comparing ~~matching~~ a differential pressure across the pump and a measured intake pressure.

37 (Original). The method as recited in claim 35, further comprising graphically displaying calculated values versus measured data on an output device.

38 (Original). The method as recited in claim 35, further comprising making operational adjustments to the electric submersible pumping system to optimize production from the well.

39 (Currently amended). A method of optimizing production when an electric submersible pumping system is used as an artificial lift system to produce a fluid, the system having a pump powered by a submersible motor, sensors for measuring production related data, and a processing system for calculating pressure, volume, and temperature (PVT) data according to a desired model, comparing measured PVT data against calculated PVT data, and optimizing production based on discrepancies determined between the measured PVT data and the calculated PVT data, ~~is used as an artificial lift system to produce a fluid,~~ the method comprising:

measuring ~~gathering~~ production related data;

comparing ~~checking~~ measured ~~pressure, volume, and temperature (PVT)~~ PVT data against calculated PVT data calculated according to a desired model; and

optimizing production based on discrepancies determined between the measured PVT data and the calculated PVT data.

40 (Currently amended). The method as recited in claim 39, wherein optimizing production based on discrepancies determined between the measured PVT data and the calculated PVT data comprises changing flow rate by adjusting a valve.

41 (Currently amended). The method as recited in claim 39, wherein optimizing production based on discrepancies determined between the measured PVT data and the calculated PVT data comprises changing flow rate by adjusting a choke.

42 (Currently amended). The method as recited in claim 39, wherein optimizing production based on discrepancies determined between the measured PVT data and the calculated PVT data comprises changing flow rate by adjusting the frequency of a variable speed drive.

43 (Currently amended). The method as recited in claim 39, wherein optimizing production based on discrepancies determined between the measured PVT data and the calculated PVT data comprises changing flow rate by replacing a production related component.

44 (Currently amended). The method as recited in claim 39, wherein optimizing production based on discrepancies determined between the measured PVT data and the calculated PVT data comprises changing flow rate by removing a blockage restricting fluid flow.

45 (Currently amended). The method as recited in claim 39, wherein optimizing production based on discrepancies determined between the measured PVT data and the calculated PVT data comprises changing flow rate by repairing a fluid leak.

46 (Currently amended). The method as recited in claim 39, wherein ~~checking~~ comparing measured PVT data against calculated PVT data calculated according to a desired model comprises comparing an above the pump gradient.

47 (Currently amended). The method as recited in claim 39, wherein ~~checking~~ comparing measured PVT data against calculated PVT data calculated according to a desired model comprises comparing an across the pump gradient.

48 (Currently amended). The method as recited in claim 39, wherein ~~checking~~ comparing measured PVT data against calculated PVT data calculated according to a desired model comprises comparing a below the pump gradient.

49 (Currently amended). The method as recited in claim 39, wherein ~~checking~~ comparing measured PVT data against calculated PVT data calculated according to a desired model comprises comparing inflow data to outflow data.